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**NATIONAL DEFENSE UNIVERSITY**  
**NATIONAL WAR COLLEGE**

**BALLISTIC MISSILE DEFENSE?**

**CORE COURSE 5 ESSAY**

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## BALLISTIC MISSILE DEFENSE?

MOSCOW (Interfax, 4 15 pm., Jan 26, 1995)—*A combat missile which violated Russian airspace has been intercepted and destroyed by Russian Air Defense Command Forces. The missile was launched from a northern European country (Norway)*

A hostile ballistic missile launch in Europe? In 1995? From Norway? This can't happen! The Cold War is over and if there is any place that stability and peace look strong and hopeful, it's Europe.

In fact, it did not happen—the missile attack and interception, that is. (Norway launched a previously announced research rocket that never got within 185 miles of Russia)(8. 1) However, the erroneous Interfax report did occur. While this incident may suggest a skittishness inside the Russian Defense Ministry, it also clearly highlights the uncertainty of a world populated by a multitude of actors with ballistic missile capabilities. But are ballistic missiles really all that important?

The proliferation of ballistic missiles (and the potential to marry them with weapons of mass destruction) compels the United States to at least evaluate their impact on US security interests throughout the world. First, one must briefly look at the systems that pose a potential threat to the United States. However, we aren't so much worried about the systems, but rather, how they will be used against the United States or US interests. So, there is a need to peer into a crystal ball to predict "the next war." With this as background, then, one can appraise the threat of ballistic missiles and likely implications of the threat. Most important, though, is the need to create an appropriate response to the threat. Thus, this paper will address the critical characteristics of a ballistic missile defense system designed to meet the needs of the United States for pursuit of its interests. To begin, one must examine the ballistic missile capabilities that the United States may face

## BALLISTIC MISSILES

Ballistic missiles are already widespread and growing. While Iraq may be out of business for the time being, plenty of other Third World countries currently own or are actively pursuing a ballistic missile capability. (See Appendix 1) Today, over twenty non-NATO countries have ballistic missile capabilities. Furthermore, these are the countries that are pursuing weapons of mass destruction (WMD). India, Libya, North Korea, Syria, and Pakistan all are known to have or are acquiring the capability to match nuclear weapons with their ballistic missiles. In fact, projections for the end of the decade now expect that within the ballistic missile community, five to ten countries will have nuclear capability, ten will possess biological weapon capability, and up to twenty could have chemical warheads to match with these delivery systems. (16: 7)

At the moment, the bulk of the missiles dispersed throughout the globe are the short range variety Scud-type missiles with ranges under 250 miles (500 km). However, the future may already be here and it is not so limited. Former Director of Central Intelligence, James Woolsey, recently highlighted the potential risk to Southeast Asia, the Pacific, and even Europe (if employed from the Middle East) from North Korea's No Dong-1 missile that has a 1000 km range. (39: A18) If that were not enough, North Korea also is developing the TD-1 and TD-2 which have ranges from 2000 to 3500 km. China is already there with the CSS-2 and its ability to reach over 3000 km. India, too, can reach very long ranges with its Agni (maximum range 2500 km). (See range comparisons, Appendix 2)

Certainly, the depth of these new missiles can change the equation of a conflict. More disconcerting, though, is the fact that there appears to be little hope for arms control measures to keep them in the hands of the few who already own them. The Missile Technology Control Regime (MTCR) seeks to limit proliferation through export controls. However, significant parties (i.e., China, North Korea, Russia) are not participants. Nor can MTCR halt indigenous programs (like those of India and Israel). Ultimately, MTCR and arms control only address the *supply* problem of the

equation--and a multitude of states are demonstrating a *demand* for such weapons. Since the supply is not completely cut off, states with a desire are finding a means to achieve their goal of gaining a cheap substitute for a manned bomber force: ballistic missiles.

Sure, the missiles are out there, but does that really impact the United States? To answer that question, one must look into the future.

### THE NEXT USE OF BALLISTIC MISSILES?

To properly prepare to defend against future threats to US national security interests, leadership must evaluate the "next war" by answering four basic questions:

1. When will the war begin?
2. What kind of a war will it be?
3. How will the war begin?
4. Where will the war begin? (18: 1)

The first question is the toughest to answer. While it clearly would be imprudent to sacrifice readiness to the point that the United States could not act tomorrow, it does not appear that a major conflict is in our near future. Desert Storm is still quite fresh on the corporate memory of the international community; and, there is no one who can honestly match conventional capability with the United States today or for the rest of this decade. Thus, while dissuaded today, a rational actor who may want to match up against the United States to pursue his agenda could now be seeking that capability to deter, defeat, or bypass US strength. Ballistic missiles could be just the capability to meet such a need. The best prediction for the next major conflict: not until after 2000 and maybe not for a full decade or more.

Given the end of the Cold War superpower standoff, and the recent US successes in the Persian Gulf War, it appears that the United States will not end up in a global-type war soon. Facing an immensely capable conventional force backed by a still viable nuclear triad, rational actors will

likely not try to take on the United States on its home turf. Rather, the most plausible scenario for the next major US conflict will come from some regional actor/state that believes the United States will not involve itself in the region or that it can deter the United States from achieving its goals. So the answer to questions two and four: a regional conflict.

To further clarify in this context, the conflict will likely occur in a region where ballistic missiles are a factor from the start of the war. Ballistic missiles have become the weapon of choice in regional conflicts, especially in the Middle East. (See Appendix 3) In fact, ballistic missiles are present in or can reach each of the world's most volatile regions with significant US national interests: East Asia, Europe, the Middle East, and South Asia. Given their "trump card" nature, ballistic missiles may provide the impetus for a regional actor, believing in his own strength, to oppose a US national security interest.

Finally, we need to answer the third question—how will the war begin? This one is probably the easiest. While it is possible that the United States would be totally prepared and allowed the luxury of another Desert Shield-type build up, it is much more probable that we will be caught off guard. Indeed, the only prudent course for preparation for the next conflict is to assume that it will come without warning (like August 1990, June 1950, or even December 1941). The implication of such a start is, of course, that the United States military will have to "come as it is" rather than build up and prepare once the confrontation spills over into a use of force. If ballistic missiles are in the scenario, the United States will face them with fielded systems—there will not be time to develop a defense on the spot.

#### **IMPLICATIONS OF BALLISTIC MISSILES**

Pretty simple: the "next war" will be a no-notice regional conflict, away from the United States, facing some sort of ballistic missile capability, but not starting for the next five to ten years.

Well, not really so simple. Ballistic missiles have the capacity to transform the circumstances of a conflict so that the "next war" may not be a war at all. Third World missiles already threaten US military installations and allies around the globe. These ballistic missiles could clearly pose a direct threat to US forces or allies, but more damaging is the indirect threat that they pose. Since ballistic missiles can reach so far, they put critical assets at risk. If ballistic missiles take out key nodes (ports, airfields, command and control facilities, . . . ) the United States may become impotent to use its conventional might in response to a regional threat. Under the worst circumstances, an adversary who wants to brandish ballistic missiles along with a nuclear, biological, or chemical (NBC) capability could raise the stakes so high that US leadership would not put up with the risk/costs and thus be deterred from acting at all.

Furthermore, ballistic missiles have the capacity to hold the international community hostage when aimed at population centers or nuclear power facilities. Even a piece of a broken conventionally tipped missile can demolish an apartment complex resulting in significant casualties. Married with WMDs, a ballistic missile could wreak havoc and bring on civilian casualty rates the likes of which have not been seen since World War II. It really doesn't matter who gets killed or where the precise target is as long as the threat is real and the missile attack creates panic and tension.

Couldn't the United States just use its nuclear fist to deter such actions? Probably not. The Persian Gulf War proved that a conventionally tipped ballistic missile causes terror, but it may not be sufficiently hostile to justify nuclear retaliation (a coalition buster below the threshold for nuclear response). Furthermore, the United States found that conventional notions of deterrence may not work. How does one deter someone who uses his own population as hostages? Indeed, given that one major lesson from the Persian Gulf War was that the United States could not truly defend itself against ballistic missiles, the next logical step for an opponent of the United States would be to pursue a credible ballistic missile capability and match it with WMDs. In fact, at least one Indian General noted that fact specifically (10 6)

Thus, ballistic missiles pose a threat to US national interests today and show every indication that they will be even more threatening in the future. Since diplomacy (arms control) and deterrence appear to be inadequate, a military response is the most logical additional approach. Lt General Charles Homer (the Joint Forces Air Component Commander for the Persian Gulf War) cited the military requirement:

When very accurate missiles with mass destruction warheads are available to Third World nations, the US will need a regional, wide-area air defense force to duplicate on a grand scale the Patriot's pivotal role of defanging the Scud. (11: 6)

Since more than a handful of Third World nations have or will have such a capability, now is the time for the United States to actively pursue a counter to that threat.

## **BALLISTIC MISSILE DEFENSE**

The Persian Gulf War was instructive and important. While others may have spied a potential US Achilles' Heel to ballistic missiles, the United States certainly recognized its need to pursue Theater Missile Defense (TMD). The current administration has elevated TMD above the former Strategic Defense Initiative (SDI). The current program is conceptually built on four pillars: passive defense, active defense; attack operations; and the battle management/command, control, communications, computers, and intelligence required to support operations. Competing for a share of the \$2-3 billion annual budget are a myriad of systems that can overwhelm even the knowledgeable. THAAD, PAC-3, AEGIS/SM-2, Corps SAM, ABL, BPI, and on, and on.

Given a quite restricted set of fiscal resources for the foreseeable future, the services will continue to battle over the share of Department of Defense funds allocated to ballistic missile defense. Thus, it is important to take a step back and look at the problem as a whole. Rather than recommend systems to solve the problem, there is a need to describe the critical characteristics of a full theater missile defense system that can meet the needs of the United States. To meet General Homer's goal



for wide area "defanging," the US TMD system should be layered, oriented on boost phase or pre-launch phase, rapidly deployable, and networked together.

## LAYERING

A theater ballistic missile can be launched from a hidden mobile launcher. Once airborne, the missile may reach incredible speeds (up to 3 km/sec). Ranges, warheads, missile sophistication, and penetration aids vary greatly across the spectrum of threat systems. This threat spectrum decreases the probability that a single defensive system will be able to stop the incoming missile. A single bullet just cannot do it all. Given the catastrophic nature of even a few "leakers," a low probability of stopping the missile is an unacceptable answer.

However, multiple attacks at the same missile offer a substantial increase in the likelihood that it will be stopped prior to reaching any lucrative target. Since the primary aim of the system is to prevent a ballistic missile from delivering its warhead to any friendly territory, the optimum defense is one that makes every attempt to intercept the missile until it is destroyed. This means attacking the missile before launch, in the ascent, during midcourse, and finally in the terminal phase using a "shoot-look-shoot" doctrine (continuing to attack until confirmation of destruction of the ballistic missile)

Multiple attacks from a single system offer increases in kill probability--multiple attacks across the life cycle of the ballistic missile (from multiple systems) offer increased probability of a kill *and* the opportunity to quit once it is destroyed. Being able to quit attacking an inbound missile is extremely important--it allows the TMD system to disregard the destroyed missile and concentrate on other inbound missiles. This attribute could be critical to protect against attacks of multiple missiles launched simultaneously

An interesting additional argument for layering is financial. If you establish a standard for the amount of "leakers" that is acceptable, creating a system with multiple layers will dramatically reduce the size of the interceptor inventory required to meet that standard (once again based on the concept

of "shoot-look-shoot"). This directly affects the cost of the entire system—the more layers, the greater reduction in cost to achieve the desired level of defense. (22: 24)

#### ATTACK OPERATIONS AND BOOST-ORIENTED APPROACH

Closely tied to the idea of layering is the need to prioritize where it would be best to intercept the ballistic missile. Clearly, the optimum circumstance would be to prevent the launch in the first place. This is the goal of attack operations that seek to destroy the ballistic missile before launch. Whether the missile is still in the factory or on the launcher rail, an attack that prevents launch certainly protects friendly assets. However, more important, attack operations usually take out capability. Destroying the factory, transportation system, or the launcher stops not just a single missile, but also the capacity to bring more missiles into the conflict. (See Appendix 4 for examples of attack operations effectiveness in a campaign) Thus, attack operations, presenting the most efficient layer of a layered defense, deserve primary focus in the TMD system.

Similarly, should a missile launch occur, the best place to destroy it would be as early as possible—in the boost or ascent phase. The desirability of such an early attack option stems from two main objectives. First, attacking an inbound missile early allows more opportunities to evaluate the defense and conduct follow-on attacks (from this or other layers). Secondly, the potential fallout from an NBC warhead cannot be allowed to enter friendly territory. Destroying a chemical warhead in flight may result in debris which contaminates the region below the intercept. Obviously, it would be best to have this debris raining down on the enemy rather than friendly assets.

In the past (during SDI days), these two avenues to ballistic missile defense did not receive the bulk of the attention. The feasibility of such operations over the USSR was highly questionable. But now, circumstances and our underlying assumptions about the next war have changed. Missile arsenals of future adversaries will be dramatically smaller than that of the former Soviet Union. Furthermore, in a regional context, the United States should be able to rapidly gain air superiority over the enemy airspace and thus enable both attack operations and boost/ascent phase intercept. Hence,

while it may have always been desirable to be oriented on early attack, it has certainly become more possible to align our TMD toward such operations.

## DEPLOYABILITY

The answer to question three above (How will the next war begin?) provides the primary motivation for this characteristic of a full TMD capability. Since the next conflict could likely be a no-notice affair in a region with little US forward presence, the entire TMD system will probably need to be brought into the theater. Whether space-based, airborne, or surface (land or sea) oriented, every asset of the TMD system will need the capability to rapidly respond to a ballistic missile threat.

The key word is rapid. As mentioned before, ballistic missiles can threaten ports and population centers at a moment's notice. Therefore, the response to those missiles must be able to arrive in a timely fashion—quick enough to deter or defend against the first set of launches. Certainly the system will have to be phased in with the rest of the theater combat capability, but it will be quite important to have an *efficient* defense in early. It does no good to bring in a significant "heavy" defense on Day 30 when the adversary's arsenal is exhausted on Day 14.

Furthermore, US Patriot protection of Israel during the Persian Gulf War displayed the flexible nature required for a full TMD system. Responsiveness to changing priorities for critical asset protection will demand deployability as a key characteristic in support of both military and political objectives.

## NETWORK

The final key attribute of a complete TMD system is the ability to have the entire system networked together. In the past, when defending against a Mach 1 aircraft, the air defense system has been allowed up to 20 minutes for the detection-to-destruction cycle response. In Iraq, a Mach 5 Scud reduced this time down to 3-4 minutes. Future high speed, advanced missile threats could further reduce the response time to less than a minute (a Mach 25 missile narrows the window to 35 seconds). This shrinking envelope to defend demands that all assets work synergistically to halt the

incoming missile. Full integration and networking of information are essential to ensure optimal resource allocation and cooperative engagement.

In the recent past, the US Air Force has proposed to take on the entire mission to facilitate such integration. While the "cradle-to-grave" ownership by a single service has merits, the key is an integrated and networked system. Given the direction of joint warfare, and the successes of the JFACC (Joint Forces Air Component Commander) system, it appears that the United States can reach this goal through organizational structure. As long as services search for interoperability (which may be assisted by the new Joint Requirements Oversight Council process), and BM/C4I experts pursue integration and connectivity from sensor to shooter, the TMD system need not reside under a single hat.

#### OTHER ISSUES

One of the biggest advantages of a fully deployed TMD system would be its dampening effect on the threat. A credible defense will negate the trump card nature of ballistic missiles and reduce them to just another weapon subject to destruction by US military might. In fact, once a fully capable TMD system is fielded, the value of ballistic missiles will fall so much that states may discontinue their pursuit of the weapons. Thus, TMD itself becomes a credible counter-proliferation tool. The more widespread the TMD capabilities are, the more likely states are to bypass the ballistic missile option.

This value of widespread TMD capability leads to a second point. NATO should be brought into the development and deployment of the US TMD system. Not only would this ensure a broader TMD capability worldwide (and hence, undermining further proliferation), but it also would offer the United States the opportunity to mitigate some of the significant costs to field such a system. Burdensharing may well indeed become the only way to actually fund this capability in the face of dramatic downward pressure on defense budgets

The sharing of TMD with NATO and broadening of the anti-missile capability will also aid in dealing with the issues associated with the ABM (Anti-Ballistic Missile) Treaty. There is more than a little debate as to the legality of current US efforts in TMD with respect to the ABM Treaty. The solution is to sidestep the debate and actively pursue a resolution with Russia (signatory as the former USSR). In the end, it is in the interest of both countries, and their allies, to develop systems that protect against theater-level missiles. Safeguards should be employed to prevent major impact to strategic forces, and thus preserve the deterrent relationship that has avoided nuclear war for decades.

One important caveat is worth mentioning when discussing ballistic missile defense. Ballistic missiles are not the only theater missile threat. Cruise missiles are also an important emerging threat. While there are some portions of a full TMD system that could assist in protecting against the cruise missile threat (i.e., attack operations), fundamentally, the defense against cruise missiles is an entirely different problem to be solved. Furthermore, if a full TMD system does indeed deter proliferation of ballistic missiles, it may drive opponents into the cruise missile arena to seek power against the United States or its interests.

## CONCLUSIONS

Overall, there is probably already a consensus on ballistic missiles. They indeed are a threat. Widespread today and proliferating, ballistic missiles are a factor in most regions where the United States has major interests. Furthermore, the threat is improving—especially in its range capabilities.

Since the United States is likely to fight its next war regionally, and since ballistic missiles will probably be a major part of the action, the United States cannot sit idly by and not prepare for such a contingency. To do so would invite some very serious consequences—preemption of US deployment/employment of forces, blackmailing the international community, or worst of all, massive casualties. The problem is exceptionally complex, and requires action along several fronts: focussing

on supply and demand; using diplomatic, technical, as well as military means; and pursued through multinational as well as unilateral approaches

The military response to ballistic missiles needs to be a well rounded Theater Ballistic Missile Defense system. Such a system requires four major attributes. It must be layered to achieve a high probability of successfully stopping an incoming missile and to optimize the system for defense against salvos of ballistic missiles. It should focus on stopping the missile before launch or while it still remains over enemy territory (attack operations and boost phase oriented). It must be able to arrive in time to defend, and thus be rapidly deployable. And finally, the system must be integrated and networked together to ensure optimal use of the assets available and cooperative engagement of inbound threats.

In the end, with this kind of theater missile defense the United States will have taken long strides toward countering a threat that imperils US interests. It is worthwhile to remember the words of Winston Churchill who also faced an air defense problem.

Certainly, nothing is more necessary, not only to this country, but to all peace-loving powers in the world . . . than that the good old earth should acquire some means of destroying the sky marauder. (35- A15)

Today, the marauder is a ballistic missile. The United States must certainly pursue a capability to "destroy the marauder."

# APPENDIX 1

## Ballistic Missiles Of Developing Countries

<i>Ballistic Missiles of Developing Countries</i>						
Country	Range Category (km)					Supplier
	30-250	300	500-650	900-1,200	≥ 1,500	
Afghanistan*		Scud B				USSR
Argentina	Alacran			Condor 2		Indigenous
Brazil	MB/EE-150	MB/EE-300	MB/EE-600	MB/EE-1000		Indigenous
	SS-150	SS-300		SS-1000		Indigenous
China	B-610	M-11	M-9	M-7	CSS-2	Indigenous
Egypt		Scud B				USSR
		Scud B	Scud C	Vector		North Korea franchise Indigenous (Condor technology)
India	Prithvi				Agni	Indigenous
Iran		Scud B				USSR
	Iran-130	Scud B	Scud C			North Korea franchise Indigenous
Iraq		Scud B				USSR
		Scud B	Scud C Al Hussein	Al Abbas Badr 2000	Al Aabad	North Korea franchise Indigenous (Scud technology) Indigenous (Condor technology)
Israel	Lance		Jencho 1		Jencho 2	Indigenous United States
Libya	SS-21	Scud B				USSR
			Scud C M-9	Al Fatah		North Korea China Indigenous
North Korea		Scud B	Scud C	No Dong 1	No Dong 2	Indigenous
Pakistan		M-11				China
	Haf 1	Haf 2				Indigenous
Saudi Arabia*					CSS-2	China
South Africa			Amistad			Indigenous (Jencho 1 Technology)
South Korea	NHK-1, -2	NHK-A				Indigenous
	Lance					United States
Syria*	SS-21	Scud B				USSR
		Scud B	Scud C M-9			North Korea China*
Taiwan	Green Bee			Sky Horse		Indigenous
Vietnam*		Scud B				USSR
Yemen	SS-21	Scud B				USSR

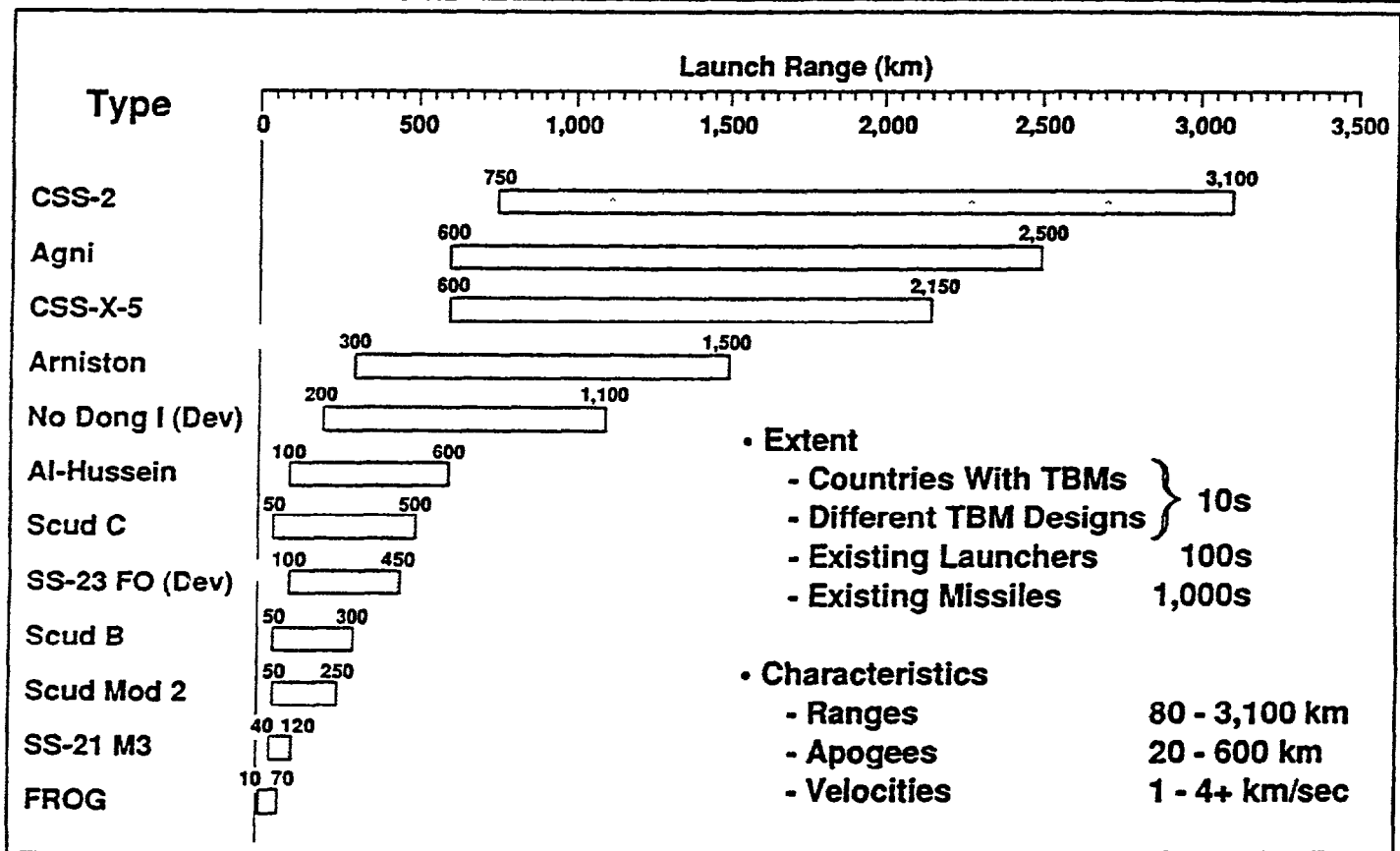
\* Since these five countries have no indigenous ballistic missile program they are not further addressed in this chapter

Source: Joint Theater Missile Defense Conops (Draft), J-36, Joint Staff, Department of Defense, November, 1994

## APPENDIX 2

BALLISTIC  
MISSILE  
DEFENSE  
ORGANIZATION

### TBM THREAT – REAL AND GROWING



Source: Ballistic Missile Defense Organization Briefing, "Ballistic Missile Proliferation, March 1994.



## APPENDIX 3

### Missile Use In Regional Conflict

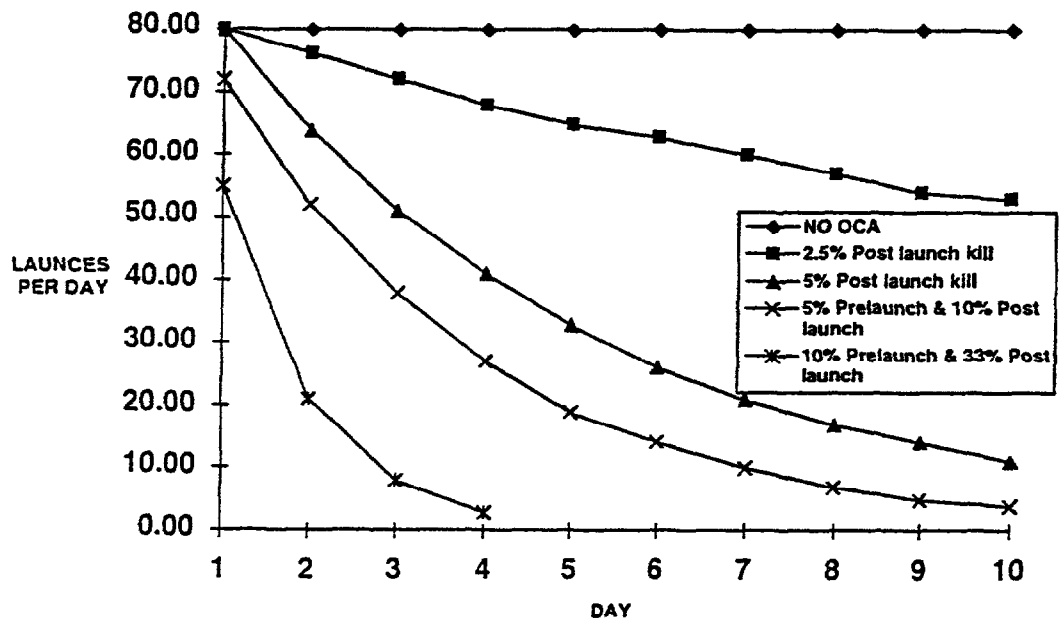
<i>Conflict</i>	<i>Date</i>	<i>Missiles Used/By</i>	<i>Against</i>
Third Arab-Israeli War	1967	Styx*/Egypt	Israel
Third Indo-Pakistani War	1971	Styx*/India	Pakistan
Yom Kippur War	1973	Gabriel, Mk 1*/Israel Scud/Egypt FROG/Syria, Egypt AS-5 Kelt*/Egypt	Egypt Israel Israel Israel
Falklands	1982	Exocet*/Argentina Sea Skua*/Great Britain	British fleet Argentina
Iran-Iraq	1980-88	Scud, FROG/Iraq Scud Oghab Iran-130/Iran Styx*/Iraq Exocet*/Iraq Armat*/Iraq Silkworm*/Iraq Silkworm * Harpoon (?)/Iran	Iran Iraq Iran U S S <i>Stark</i> Iran Iran Iran Iraq
U S -Libya clash	1986	Scud/Libya Harpoon*/United States	Lampedusa (Italy) Libya
Afghanistan	1988-91	Scud/Afghan army	Afghan mujaheddin
Persian Gulf	1991	Scud (Al Hussein), FROG/Iraq Tomahawk*/United States	Israel, Saudi Arabia, Qatar, Bahrain Iraq
Yemen Civil War	1994	Scud/Yemen	Yemen

\* Aerodynamic missile

Source. Joint Theater Missile Defense Conops (Draft), J-36, Joint Staff, Department of Defense, November, 1994.

## APPENDIX 4

# OCA Effects on TBM Launches



- 40 launcher baseline
- Each surviving launcher attempts two launches per day

Source. HQ USAF/TA, Theater Air Defense Office, March 1995.

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